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ABSTRACT

To determine the influence of media on learning, a study explored students' preferences, perceived difficulty, and learning in relation to a variety of activities. A randomly selected panel of 611 students, grades three through ten, was drawn from the nine schools (six elementary, two junior high, and one senior high) that make up an entire public school system in Tennessee. Students completed a self-administered questionnaire and then chose between two electronic media activities (watching television or using a computer) and two print-oriented activities (writing or reading). Data were then examined in group level analyses, individual analyses, and demographic analyses. Among the findings were the following: (1) males preferred electronic media activities and considered them to be more educational than did females; (2) females selected writing and reading more often then did males; (3) students in lower grades preferred using a computer, considering it less difficult than did older students; and (4) watching television and reading were considered to be significantly more difficult by younger students than by older students. Perhaps most important, students appear to perceive their preferred activities as being easiest, and the easier the activities are perceived to be, the more students believe they learn from them. Further research is needed to support these findings. (Diagrams and tables of findings are included.) (DF)

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Media Influence on Learning: Examining the Role of Preconceptions

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Media Influence on Learning:
Examining the Role of Preconceptions

The Problem

Research exploring the relationship between media use and learning has typically followed two distinct, though parallel, paths. The first has dealt with in-school media use and has been designed to test direct learning effects resulting from exposure to specific, curriculum-based media content (for review see Clark, 1983; Jamison, Suppes & Welles, 1974). A traditional in-school media use study might pose the question: Do students learn more about a particular topic from a televised presentation on the subject or from a textbook explanation? These studies address the issue of instructional effectiveness, that is, student learning, usually from a media comparison perspective.

The second path of research on media use and learning has examined the influence of out-of-school media use. Rather than assessing curriculum-based learning effects, this research tradition has focused on the generalized effects of media use on educational achievement applying a displacement model (for review, see Hornik, 1981; Morgan & Gross, 1982). For example, the original studies of out-of-school media influence (Himmelweit, Oppenheim & Vince, 1958; Schramm, Lyle & Parker, 1961) posed such questions as: What education-oriented activities are displaced by the introduction of television into the home, and what is the impact of this displacement process on educational achievement? The dependent measure of educational achievement in studies of out-of-school media influence is typically a standardized reading test score.

Despite the divergent paths and approaches followed by in-school and out-of-school media effects research, recent reviews (Clark, 1983; Hornik, 1981) have concluded that both routes have, in fact, led us to the same destination--back to the starting point. In reviewing research on in-school media effects, Clark (1983) concluded, "The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" (Clark, 1983, p.445). Hornik's (1981) synthesis of research on out-of-school television effects assessed decades of findings in a similar fashion, concluding that researchers have failed in their efforts to demonstrate a significant relationship between media use (television viewing) and educational achievement (reading scores).

Clark (1983) has proposed that future research should begin by investigating "variables having to do with our attributions or beliefs about media" (p. 454). Such work, he argued, would prove to be the single most useful approach for examining media influence on learning. Hornik's conclusions point future research in a different direction. He suggests a thorough examination of the differences in the relationship between media use and educational achievement among subgroups in the population. According to Hornik, "Specification is the order of the day. What sorts of people of what ages are particularly vulnerable to television's effect?" (1981, p. 211). Current research is beginning to respond to the recommendations of both Clark and Hornik. Most of this work can be traced to the conceptual groundwork laid by Salomon in his efforts to construct a model of learning from media.

Current Research

Salomon (1981; 1983; 1984) has identified and tested a model explaining the process by which children learn from in-school media applications. This model draws heavily on schema theory and on understanding the individual's context of expectations for a particular situation. It focuses on the relationships among three constructs: the perceived demand characteristics of the situation, the individual's perceived self-efficacy for using a particular medium, and the amount of mental effort the individual invests in processing the message. According to Salomon's model (See Figure 1), these three constructs explain the amount of learning which will result from media exposure as follows: "perceived demand characteristics of the task, material and context are ... related to perceived self-efficacy and both affect AIME (the amount of invested mental effort), which in turn influences learning" (Salomon, 1984, p. 649).

Figure 1 about here

Salomon has reported on a series of experiments (Salomon, 1983; Salomon & Leigh, 1984) testing this model and exploring the nature of children's contexts of expectations about different media as predictors of learning. He has examined differential learning effects resulting from distinct sets of media preconceptions. For example, he has compared students' learning from reading a book with learning from watching a televised presentation of the same content. In general, he has found that students learn more from a book because, he explains, the perceived demand characteristics of reading are higher and consequently students invest more mental effort in processing the content. His findings are corroborated by the results of the Project Zero studies (Meringoff, Vibbert, Char, Fernie, Banker & Gardner, 1983). Csikszentmihalyi and Kubey (1982) reported similar results for adult assessments of investments of mental effort for viewing television and reading books; that is, respondents reported

greater cognitive investments while reading than while viewing television. Greater investments of mental effort, according to the Salomon's model, result in more elaboration on, in essence, more learning from the content.

Salomon has also investigated the effects on learning based on the purpose ascribed to the media activity, for example watching a television program for enjoyment as opposed to watching it for instructional purposes. Again, he has found that learning is enhanced when students invest more mental effort because the perceived demand characteristics of the task are higher, in this case instructional contexts, as opposed to enjoyment contexts. Similar findings, regarding the effects of task perception on learning outcomes, have been reported by Krendl and Watkins (1983). This study reported that students instructed to view a television program for educational purposes responded to the content with a deeper level of understanding; that is, they reported more story elements when asked to reconstruct the content, and they included more analytical statements about the meaning of the show.

Roberts, Bachen, Hornby and Hernandez-Ramos (1984) have reported on the first results of a three-year study of second, third and sixth graders' media use and reading achievement incorporating Salomon's ideas about the process of media influence on learning and Hornik's suggestion about investigating possible demographic differences. In particular, they articulated five constructs which they considered important for understanding an individual's expectations about particular media activities: SES, home media environment, media use, media orientation and media involvement. Though the findings of this study with only one wave of data analyzed are intended primarily to identify questions to be addressed in future analyses, the approach adopted by the researchers represents an important contribution in terms of its effort to examine the multidimensional nature of the process of out-of-school media influence by integrating the

theoretical orientation and associated constructs from Salomon's research on in-school media effects on learning.

The present study assumes the model articulated by Salomon (1981; 1983; 1984) and tested by Salomon and Leigh (1984) and Roberts et al. (1984). However, its focus is limited to a more precise description of the expectations individuals bring to a media activity in view of their implications for learning effects. That is, this study assumes that a better understanding of the complex expectations individuals bring to the media is fundamental to future study of media influence on educational achievement.

Clark's (1982; 1983) work in this area has identified three fundamental dimensions of people's beliefs and attributions about the media--preference, difficulty and learning. Adopting the traditional in-school media comparison approach, studies of media preference and learning have concluded that students typically tend to like the media activity least from which they learn the most; that is, in curricular applications, preference and learning are negatively related. This relationship is consistent across a variety of modes of instruction in media comparison studies. Saracho (1982) found that students in a computer-assisted instructional mode learned more but liked the computer less than other students; Machula (1978-1979) reported similar results for television as a medium of instruction; and Salomon (1984) concluded that students exposed to book presentations learned more but enjoyed it less than those who viewed a televised presentation of the same content. Researchers have also examined the difficulty dimension in relation to preference and learning in in-school studies of media influence on learning. For example, Salomon and Leigh (1984) reported that students preferred the medium they found easiest to use, and the easier it was to use, the more they felt they learned from it. However, measures of inference making suggested that these perceptions of enhanced learning from the "easy" medium were misleading.

The data presented here build on these previous efforts in their examination of the nature of individuals' expectations regarding preference, perceived difficulty and learning in relation to a variety of particular activities. Thus, following the suggestions of Clark on investigating individuals' media attributions and beliefs and Hornik's ideas about specifying differences among subgroups of the population, this study addresses a series of questions: How do individuals' expectations on the dimensions of preference, difficulty and learning compare both within and across various activities? What are the differences in the preconceptions of these activities across demographic subgroups? And finally, what are the implications of these results for future research on media and learning? Thus, the goal of this paper is to present data which respond to the suggestions proposed by Clark and Hornik and to identify hypotheses for future research in the study of media and education.

Method

A randomly selected panel of students, grades three through ten (N=611), was drawn from nine schools (six elementary, two junior high, and one senior high) which make up an entire public school system in Tennessee. Students completed a self-administered questionnaire, which included questions about media preconceptions and media use, as well as about activities related to literacy and school achievement. In addition, they were asked to make direct choices between two electronic media activities (watching television or using a computer) and two print-oriented activities (writing or reading). They made these judgments on the three dimensions specified above: preference (which activity they would rather do), difficulty (which activity they would find more difficult to do), and learning (which activity they would learn more from). For each dimension, students were asked to make paired comparison judgments about

all possible combinations of the four activities (yielding six judgments on each dimension). Two examples are presented here for each dimension:

Which would you rather do...

use a computer or write?
write or watch television?

Which would be more difficult for you...

watch television or read a book?
read a book or use a computer?

Which would you learn more from...

use a computer or watch television?
read a book or write?

As in Salomon's work, the definition of the type of activity (for example, writing a letter or writing a term paper) were intentionally left open to interpretation by the individual student. Only the dimension (preference, difficulty or learning) on which to judge the activities was specified. We were interested in the student's general, rather than specific, set of expectations relating to the activity.

Results

In an effort to explicate subjects' preconceptions about these four activities, the paired comparison data were examined in three ways: group level analyses, individual level analyses and demographic analyses.

Group Level Analyses

First, we applied a measurement model derived from Thurstone's (1927) law of comparative judgment. This approach permits the researcher to transform paired comparison data, in this case students' preference, difficulty, and learning judgments for the four activities, into an interval scale of the distance between the alternatives (for explanation, see Nunnally, 1967). The final scale is derived from the proportion of the sample selecting each item. Table 1 presents these raw proportions.

Table 1 about here

Following Thurstone's transformation procedures, the resulting scale for preference judgments, based on the proportions given in Table 1, yielded a scale ranging from 0 to .98, with writing being the least preferred activity and using a computer the most preferred. For perceived difficulty, the range was 0 (television) to 1.71 (computer), and for perceived learning, it was 0 (television) to 1.31 (reading). Figure 2 compares the placement of the four activities and their relative dispersion across the three scales in line graph form.

Figure 2 about here

Reading, watching television, and using a computer tend to be relatively close to one another on the preference scale, whereas writing stands alone at the bottom of the scale. The perceived difficulty scale is the most widely dispersed scale. Students' perceptions of the relative difficulty of each activity in comparison to the others are more distinct. Only writing and using a computer are judged as being fairly similar in their levels of difficulty. Both are judged as being considerably more difficult than reading, and far and away more difficult than watching television. On the learning scale, we find that reading and using a computer are perceived as being relatively close to one another and at the high end of the scale. Writing is rated toward the bottom, and television, again, takes the zero point on the scale.

Thus, Figure 2 illustrates that the four activities are, indeed, assessed differently along different dimensions. For example, computers are generally

preferred; and they are also perceived to be difficult to use; but at the same time, they are thought to be educational. In contrast, writing is not preferred; nor is it perceived to be educational; but it is considered to be difficult. Television is preferred over the print-oriented activities of reading and writing, and it is perceived to be very easy to use. However, students reported that television was the least likely of the four activities to result in learning. Reading is ranked slightly above the mid-point for preference and difficulty, but it is perceived to be the most educational acitivity.

Individual Level Analyses

A second way to examine these data is to consider them as individual level scores rather than as group judgments. Therefore, for each student, preference, difficulty, and learning scores, consisting of how many times each activity was selected, were calculated. Correlations of these scores are presented in Table 2.

Table 2 about here

The correlation matrix presents significant, though moderate, negative relationships between one's preference for a particular activity and that same activity's perceived difficulty. (Note the correlations between computer preference and computer difficulty, -.12, between writing preference and writing difficulty, -.21, television preference and television difficulty, -.14, and reading preference and reading difficulty, -.26). However, one's preference for an activity is positively associated with its perceived educational value (computer preference and computer learning, .28; writing preference and writing learning, .20; television preference and television learning, .15; and reading preference and reading learning, .29). Relationships between difficulty and

learning are consistently positive but of less magnitude (computer difficulty and computer learning, .11; writing difficulty and writing learning, .09; television difficulty and television learning, .15; and reading difficulty and reading learning, .01). Though the correlations are, for the most part, rather small, Table 2 demonstrates that in general, the more an activity is preferred, the less difficult it is perceived to be, but the more likely one is to think one will learn from it.

Demographic Analyses

Gender Differences. The final analysis of the data follows Hornik's (1981) suggestion to study differences among various demographic subgroups in pursuing the question of media influence on learning. Two demographic variables--gender and grade in school--are examined in terms of their relationship to students' preference, difficulty, and learning scores. The mean differences are presented in Tables 3 and 4. Mean scores reflect the average number of times each activity was selected by members of the subgroups.

Males and females were significantly different on all activity preference scores, as presented in Table 3.

Table 3 about here

Males chose computers ($F_{1,609}$ =20.40, $p<.01$) and television more often than females ($F_{1,609}$ =6.92, $p<.01$), whereas females selected traditional print-oriented activities of reading ($F_{1,609}$ =18.09, $p<.01$) and writing ($F_{1,609}$ =6.28, $p<.05$) more often than males.

Gender differences on perceived difficulty scores, also presented in Table 3, show that females reported more perceived difficulty than males on using computers ($F_{1,609}$ =6.03, $p<.05$), while males were significantly different from

females in their higher perceptions of writing difficulty ($F_{1,609}$ =5.17, p<.05). Males and females were quite similar in their assessments of perceived television and reading difficulty in relation to the other activity choices.

Results on learning scores presented at the bottom of Table 3 report gender differences on all activity choices. Males reported that they thought they learned more from using computers ($F_{1,609}$=5.90,p<.05) and watching television ($F_{1,609}$ =17.29, p<.01) than females, whereas females reported greater learning from reading ($F_{1,609}$ =3.69, p<.05) and writing ($F_{1,609}$ =.12.11, p<.01) than males. This pattern is identical to that of preference choices, with males favoring selections of television and computers and females favoring reading and writing. Males reported more learning from electronic media activities than females, and females reported more learning from print-oriented activities than males.

These results are consistent with findings from traditional educational research on gender differences, which concludes that females orient toward verbal activities, and with recent work on gender differences as they relate to computers. Males' attitudes toward computers are reported to be more positive and their self-reports of computer skills are higher than are females estimates of attitudes and skills (Chen, 1985; National Center for Education Statistics, 1982).

Grade Differences. Significant differences attributable to grade in school appeared for preference judgments for using a computer ($F_{7,601}$ =4.33, p<.01) and watching television ($F_{7,601}$ =6.99, p<.01). Computer preference declined steadily from the third grade mean of 2.31 to the tenth grade mean of 1.66. A reverse pattern emerged for television preference, from a low at the third grade of 1.39, to a high at the tenth grade of 2.27. No grade differences appeared for reading or writing preference scores.

Table 4 about here

Significant grade differences on the difficulty scores appeared for using a computer ($F_{7,601}$ =8.61, p<.01), watching television ($F_{7,601}$ =3.65, p<.05), and reading a book ($F_{7,601}$ =3.33, p<.05). Not only did students in the lower grades say that they preferred using a computer to other activities, they also perceived computer use to be less difficult than did older students. Examination of data on specific uses showed that elementary students reported more frequent, more diverse and less intimidating exposure to computers both for educational (in school work) and entertainment (games) applications than did junior high and high school students, who report high levels of use primarily in the area of programming.

Both watching television and reading were considered to be significantly more difficult by younger students than by older students. Younger students, who are only beginning to become masters of the media, found watching television and reading to be more difficult than did older students. These results confirm research findings from developmental studies of both television viewing (Collins, Wellman, Keniston & Westby, 1978; Wartella, 1980) and reading (Chall, 1979; 1983). Both areas of research have concluded that until children have reached certain levels of maturity, they are not capable of fully understanding content. The task of "watching" television or of "reading" a book consists largely of practicing a decoding process, rather than of extracting meaning. Reading and watching television are activities; they are ends in themselves for the young child, rather than means of gaining new information. As young children become more experienced and practice the requisite skills, these initial perceptions of difficulty diminish.

For learning judgments, significant grade differences appeared for writing ($F_{7,601}$ =2.60, p<.05) and reading ($F_{7,601}$ =2.53, p<.05). The very youngest and very oldest students reported the highest scores for learning from writing. It appears that initially, as students learn to write, they perceive the activity to be educational. However, this perception declines steadily until they reach high school (in this school system, at the tenth grade). At this point, there is a marked increase in students' perceptions of writing as a learning activity. Perceptions of learning from reading, on the other hand, tend to increase as students advance to upper elementary grades in school and then level off. Third and fourth graders were lowest in their assessments of learning from reading, with sixth through tenth graders reporting relatively consistent, higher perceptions of the educational value of reading in relation to the other activity choices.

The results of grade differences on the learning dimension support this interpretation. Students' preconceptions of reading as a learning activity remain stable and high from about the fifth grade on. These students understand that reading is not only a decoding process, but a means of extracting new information, of learning.

Discussion

Traditional research on what is broadly referred to as media influence on learning has suffered from serious limitations, according to critics. Their complaints focus on researchers' inability to demonstrate clear-cut effects for either in-school or out-of-school media use. This study contributes to the theoretical framework for studying media influence on learning and synthesizes recent literature on the topic by 1) introducing measures of user preconceptions (Clark, 1983) about activities, 2) examining differences in these preconceptions across demographic subgroups (Hornik, 1981) based on gender and age, and

3) interpreting the results according to a theoretical learning model proposed by Salomon (1981; 1983; 1984).

The data reported here suggest that one's preconceptions about a particular medium or activity vary across the three fundamental dimensions identified by Clark (1982; 1983). Preconceptions differed depending on whether the student was considering the activity based on preference, ease of use, or a need to learn.

In addition, the results here suggest that various demographic subgroups differ in their preconceptions about activities on the dimensions of preference, difficulty, and learning. Males more than females preferred electronic media activities (using a computer or watching television) and considered them to be more educational than did females, who preferred reading and writing more than did males, and considered these print-oriented activities as more educational than did males. Males considered writing to be significantly more difficult than did females, and females considered computers significantly more difficult than did males.

Important differences in preconceptions about activities, attributable to grade in school, also appear. Younger students preferred computers over other activities, and they thought computers were less difficult to use than older students. They also perceived that they were more likely to learn from computers than did older students. Elementary students reported lower preferences than junior high and high school students for watching television, an activity that they also considered more difficult than did older students. Perceptions of reading difficulty and of learning from reading were significantly different, as well, with younger students reporting reading was more difficult and older students reporting learning more from reading.

Finally, this study builds on Salomon's learning model in its examination of the relationships among individuals' preconceptions of activity preference,

difficulty and learning. This model proposes that one's set of expectations regarding a particular activity has direct implications for learning outcomes. Salomon's experimental research, based on relatively small samples of elementary school students, has concluded that preferred activities are those perceived to be easiest, and the easier activities are perceived to be, the more subjects report learning from them. Results from the descriptive data presented herein support this finding. Here, across a broad representative sample, including students in elementary, junior high and high school, the more an activity is preferred, the less difficult it is perceived to be, but the more likely students are to think they will learn from it. However, according to Salomon, the belief in enhanced learning from an activity that is preferred and less difficult is, in fact, a misperception. He suggests that students learn significantly less from such activities. Salomon's results propose that the greatest learning effects at least in the school setting should appear for activities less preferred and perceived to be more difficult.

Though descriptive data such as those presented herein cannot resolve the effects issue, the results of this study synthesize previous research and identify hypotheses to be addressed in future work. In general, these findings support the relationships among the three dimensions specified by Salomon's learning model. However, remaining questions focus specifically on the relationships between these dimensions and measures of educational achievement. Salomon has articulated a theoretical model and presented experimental data identifying what the nature of those relationships should be. The next step on the research agenda of media influence on learning is to test these hypothesized relationships in the field context.

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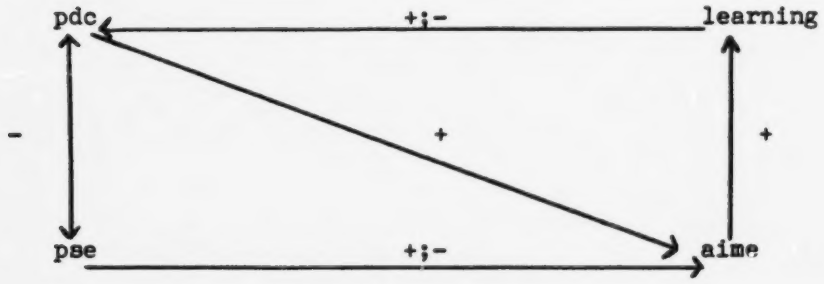
Figure 1

Salomon's Model of the Relationships among Perceived Demand Characteristics, PerceivedSelf-Efficacy, Amount of Invested Mental Effort and Learning



Source: G. Salomon, Television is "easy" and print is "tough." Journal of Educational Psychology, 76, p. 650.

Figure 2

Activity Judgment Scales for Preference, Difficulty and Learning

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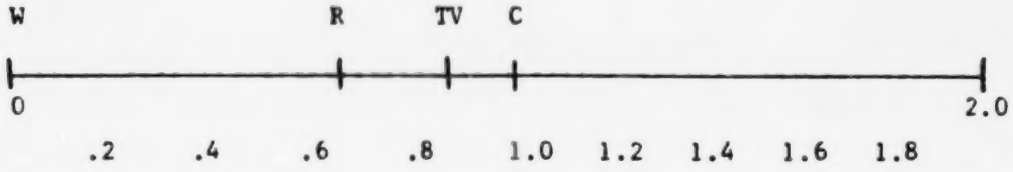
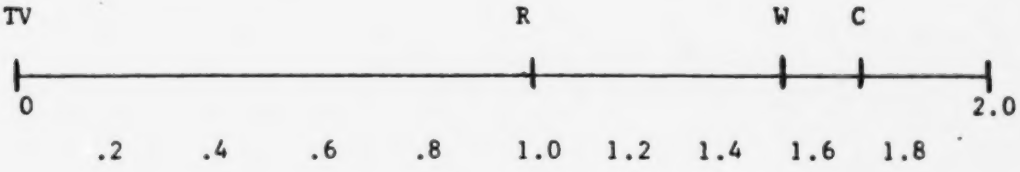
Key: C = Computer
R = Read
TV = Television
W = Write

Preference Scale



Difficulty Scale



Learning Scale

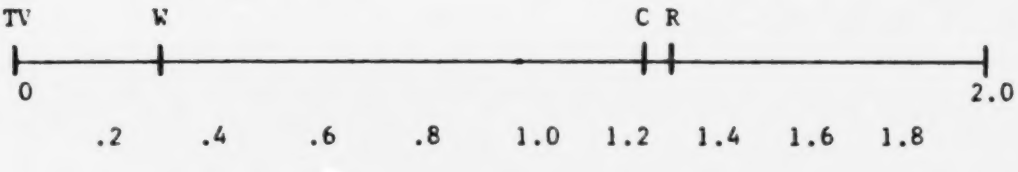


TABLE 1

RAW PROPORTIONS OF PREFERENCE, DIFFICULTY AND LEARNING JUDGMENTS*

	CP	WP	TVP	RP	CD	WD	TVD	RD	CL	WL	TVL	RL
CP		.19	.42	.36								
WP	.81		.83	.75								
TVP	.58	.17		.43								
RP	.64	.25	.57									
CD						.37	.07	.24				
WD					.63		.05	.26				
TVD					.93	.95		.89				
RD					.76	.74	.11					
CL										.16	.14	.49
WL									.84		.39	.85
TVL									.87	.62		.92
RL									.51	.15	.08	

CP=Computer Preference
WP=Writing Preference
TVP=Television Preference
RP=Reading Preference
CD=Computer Difficulty
WD=Writing Difficulty
TVD=Television Difficulty
RD=Reading Difficulty
CL=Computer Learning
WL=Writing Learning
TVL=Television Learning
RL=Reading Learning

*Reading down each column shows how many people chose each activity. Thus, in the first column of the table, 81% chose using a computer over writing, 58% chose using a computer over watching television and 64% chose using a computer over reading.

Table 2

Correlations of Preference, Difficulty, & Learning

	CP	WP	TVP	RP	CD	WD	TVD	RD	CL	WL	TVL	RL
CP	1.00											
WP	-.31**	1.00										
TVP	-.23**	-.22**	1.00									
RP	-.30**	-.17**	-.39**	1.00								
CD	-.12**	.16**	.15**	.14**	1.00							
WD	.18**	-.21**	.04	.19**	-.30**	1.00						
TVD	-.00	.09*	-.14**	.08*	-.19**	-.25**	1.00					
RD	.21**	.11*	.16**	-.26**	-.23**	-.12**	-.26**	1.00				
CL	.28**	-.06	.05	-.04	.11**	.13**	.02	.13**	1.00			
WL	-.04	.20**	-.01	.02	.06	.09*	-.03	.04	-.18**	1.00		
TVL	.02	-.01	.15**	-.09*	-.02	-.09*	.15**	.11**	-.20**	-.53**	1.00	
RL	-.05	-.00	.06	.29**	.23**	.18**	-.09*	.01	-.29**	-.10*	-.14**	1.00

* $p < .05$
** $p < .01$

Key:
CP = Computer Preference
WP = Writing Preference
TVP = Television Preference
RP = Reading Preference
CD = Computer Difficulty
WD = Writing Difficulty
TVD = Television Difficulty
RD = Reading Difficulty
CL = Computer Learning
WL = Writing Learning
TVL = Television Learning
RL = Reading Learning

TABLE 3

MEAN PREFERENCE, DIFFICULTY AND LEARNING JUDGMENTS
FOR COMPUTER, WRITING, WATCHING TELEVISION AND READING BY GENDER

Preference Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.00	.61	1.75	1.49
Gender:				
Male	2.18	.53	1.89	1.32
Female	1.83	.69	1.69	1.66
	$F_{1,609}=20.40^{**}$	$F_{1,609}=6.28^{*}$	$F_{1,609}=6.92^{**}$	$F_{1,609}=18.09^{**}$

Difficulty Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.26	2.02	.23	1.36
Gender:				
Male	2.17	2.10	.23	1.39
Female	2.34	1.95	.23	1.33
	$F_{1,609}=6.03^{*}$	$F_{1,609}=5.17^{*}$	NS	NS

Learning Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.17	.91	.59	2.21
Gender:				
Male	2.25	.80	.72	2.15
Female	2.08	1.02	.46	2.27
	$F_{1,609}=5.90^{*}$	$F_{1,609}=12.11^{**}$	$F_{1,609}=17.29^{**}$	$F_{1,609}=3.69^{*}$

*p<.05
**p<.01

TABLE 4

MEAN PREFERENCE, DIFFICULTY AND LEARNING JUDGMENTS
FOR COMPUTER, WRITING, WATCHING TELEVISION AND READING BY GRADE IN SCHOOL

Preference Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.00	.61	1.75	1.49
Grade in School:				
Third	2.31	.61	1.39	1.59
Fourth	2.27	.53	1.65	1.40
Fifth	2.10	.48	1.64	1.52
Sixth	2.01	.74	1.70	1.49
Seventh	2.02	.66	1.65	1.65
Eighth	1.92	.65	2.11	1.40
Ninth	1.75	.65	1.94	1.59
Tenth	1.66	.65	2.27	1.38
	$F_{7,601}=4.33$*		$F_{7,601}=6.99$*	

Difficulty Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.26	2.02	.23	1.36
Grade in School:				
Third	1.92	1.91	.44	1.59
Fourth	1.81	2.01	.35	1.55
Fifth	2.04	2.09	.19	1.45
Sixth	2.42	2.03	.30	1.24
Seventh	2.43	1.95	.24	1.37
Eighth	2.40	2.09	.11	1.24
Ninth	2.53	2.09	.07	1.21
Tenth	2.49	2.13	.11	1.27
	$F_{7,601}=8.61$**		$F_{7,601}=3.65$*	$F_{7,601}=3.33$*

Learning Judgments

	Computer	Writing	Television	Reading
Grand Mean	2.17	.91	.59	2.21
Grade in School:				
Third	2.36	1.05	.43	2.04
Fourth	2.31	.97	.48	1.97
Fifth	2.20	.90	.54	2.19
Sixth	2.03	.93	.67	2.29
Seventh	2.24	.88	.52	2.33
Eighth	2.15	.98	.61	2.25
Ninth	2.10	.59	.80	2.33
Tenth	2.02	1.01	.62	2.32
		$F_{7,601}=2.60^{*}$		$F_{7,601}=2.53^{*}$

*p<.05
**p<.01